



**ENVIRONMENTAL COMPLIANCE SERVICES, INC.**

OCT 26 9 41 AM '99

WASTE MANAGEMENT  
DIVISION

October 25, 1999  
Project #40191  
Document: Site\_inv

Mr. Chuck Schwer, Supervisor  
Sites Management Section  
VT DEC Waste Management Division  
103 South Main Street  
Waterbury, VT 05671-0404

**RE: Site Investigation Report  
Brattleboro D.P.W. Well Field, Route 30, Brattleboro, VT  
DEC Site #99-2661**

Dear Mr. Schwer:

Enclosed please find the above-referenced report for your review. If you have any questions or require further information, please call me at 802-257-1195.

Sincerely,  
ENVIRONMENTAL COMPLIANCE SERVICES, INC.

David C. Balk, P.G.  
Project Manager

enclosure

cc: Steve Barrett, Brattleboro DPW

Phase	Type
<b>X Initial Site Investigation</b> <input type="checkbox"/> Corrective Action Feasibility Investigation <input type="checkbox"/> Corrective Action Plan <input type="checkbox"/> Corrective Action Summary Report <input type="checkbox"/> Operations and Monitoring Report	<input type="checkbox"/> Work Scope <b>X Technical Report</b> <input type="checkbox"/> PCF Reimbursement Request <input type="checkbox"/> General Correspondence

**Site Investigation Report**  
 Brattleboro Well Field Water Treatment Building  
 Route 30  
 Brattleboro, Vermont  
 SMS Site #99-2661

*Prepared for:*

Brattleboro Department of Public Works  
 Brattleboro, Vermont 05301  
 Contact: Steve Barrett  
 Phone: (802) 254-4255

*Prepared by:*

Environmental Compliance Services, Inc.  
 157 Old Guilford Road #6  
 Brattleboro, VT 05301  
 Contact: David C. Balk, P.G.  
 Phone: (802) 257-1195

Project No.: 40191.10

October 14, 1999

WASTE MANAGEMENT

Oct 26 9 41 AM '99

**Site Investigation Report  
Brattleboro Well Field Water Treatment Building  
Site #99-2661**

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Appendix A	Site Locus Map
Appendix B	Site Plan
Appendix C	Soil Boring/Monitoring Well Construction Logs
Appendix D	Laboratory Data Sheets and Chain of Custody Record

## 1.0 Introduction

On July 20, 1999 a 1,500 gallon #2 fuel oil underground storage tank (UST) was removed from outside the Brattleboro Well Field Water Treatment Building ("the site;" see locus map, Appendix A). Environmental Compliance Services, Inc. (ECS) screened soils from the tank excavation with a Photovac Model 2020 photoionization detector (PID) for the presence of Volatile Organic Compound (VOC) concentrations. The levels of contamination ranged from 0 to 178 parts per million (ppm). Approximately 15 cubic yards of contaminated soil was removed and stockpiled at the Department of Public Works Facility on Fairground Road. A soil sample was collected on July 22, 1999 from the tank grave and submitted for analysis of VOCs and Total Petroleum Hydrocarbons. No concentrations were detected above the minimum detection limit for the compounds analyzed. A tank closure report was submitted to the VT DEC.

Due to the sensitive nature of the site, subsurface investigations to assess the extent and degree of petroleum contamination in soil and/or groundwater at the site was conducted.

This report documents the work performed by ECS at the site and presents results, conclusions and recommendations.

## 2.0 Site Description

The subject property exists at an elevation of approximately 238 feet above mean sea level. The Brattleboro Well Field property consists of one building and a series of underground water storage tanks. The site is surrounded by wetlands. To the west is Route 30 and to the east is the West River. To the south is the Retreat Meadows and Brattleboro Retreat Hospital, a rehabilitation facility. The site is maintained as a backup source for water in the event of a catastrophic failure of the town water supply.

Observations made during the removal of the fuel oil UST in July 1999 indicate that the soils in the tank pit were dark brown coarse sand and gravel to 12 1/2 feet below ground surface (bgs). Groundwater oxidation staining was encountered at approximately seven feet bgs with standing water at 12 1/2 feet bgs. No ledge was encountered in the tank grave. A new propane UST was installed approximately 30 feet south of the former UST location.

## 3.0 Work Performed

### 3.1 Soil Borings and Monitoring Wells

During the UST removal on July 20, 1999 a monitoring well (ECS-1) was installed in the tank grave via a town operated backhoe. ECS installed three soil borings on September 9, 1999, designated SB-1, SB-2, and SB-3 using a truck mounted hydraulic push probe drill rig (Earthprobe). Monitoring well and soil boring locations are shown on the site plan in Appendix B. Monitoring well ECS-1 is 13 feet deep, and constructed of 2 inch diameter schedule 40 PVC slotted screen (size 10). Soil boring logs are presented in Appendix C.

### 3.2 Field Screening of Soil Samples

During Earthprobe soil borings, continuous soil samples were obtained at four-foot intervals from each of the boreholes. The samples were field screened for VOCs with a PID (field calibrated to an isobutylene span gas and referenced to benzene), using bag headspace protocol. No VOC levels were detected above the minimum detection limit of 0.1 ppmv in the borings.

### *3.3 Groundwater Sampling*

Groundwater from monitoring well ECS-1 was sampled on July 29, 1999, using a disposable plastic bailer. The sample was obtained after three borehole volumes of groundwater were evacuated from the monitoring well. During the advancement of Earthprobe soil borings on September 9, 1999, groundwater was collected from the borings using plastic tubing equipped with a check valve. A duplicate groundwater sample from SB-3 was obtained for quality control purposes. All samples were stored on ice immediately upon collection, and refrigerated until delivery was made to Spectrum Analytical, Inc. in Agawam, Massachusetts for analysis of BTEX compounds, MTBE, Trimethylbenzenes and Naphthalene by EPA Method 8021B and Total Petroleum Hydrocarbons (TPH) by EPA Method 8100M.

## **4.0 Results**

### *4.1 Groundwater Flow Direction*

Groundwater at the site could be interpreted as easterly in the direction of the West River. The site locus map shows the general topography in the area and the close proximity of the West River. Based on past investigations of sites in the Brattleboro area flood plain, the groundwater table is considered relatively flat at the site, trending slightly to the east.

### *4.2 Laboratory Analysis of Groundwater Samples*

The groundwater samples obtained on July 29, and September 9, 1999 were analyzed by EPA Methods 8021B and 8100M. Results are presented in Table 2, which includes Primary Groundwater Quality Standards (PGQS) for reference. The complete laboratory data sheets and chain of custody record are presented in Appendix D.

**Table 2. Results of laboratory analysis of groundwater samples.**

Date	Compound	PGQS	ECS-1	SB-1	SB-2	SB-3
9/9/99	Benzene	5.0	NT	ND	ND	ND
	Toluene	1000	NT	ND	ND	ND
	Ethylbenzene	7000	NT	ND	ND	ND
	Xylenes	10,000	NT	ND	ND	ND
	Total BTEX		NT	ND	ND	ND
	Naphthalene	20	NT	ND	ND	ND
	1,2,4-Trimethylbenzene	5.0	NT	ND	ND	ND
	1,3,5-Trimethylbenzene	4.0	NT	ND	ND	ND
	MTBE	40	NT	ND	ND	ND
	TPH		NT	ND	ND	ND
7/29/99	Benzene	5.0	ND	NA	NA	NA
	Toluene	1000	ND	NA	NA	NA
	Ethylbenzene	7000	ND	NA	NA	NA
	Xylenes	10,000	ND	NA	NA	NA
	Total BTEX		ND	NA	NA	NA
	Naphthalene	20	ND	NA	NA	NA
	1,2,4-Trimethylbenzene	5.0	ND	NA	NA	NA
	1,3,5-Trimethylbenzene	4.0	ND	NA	NA	NA
	MTBE	40	ND	NA	NA	NA
	TPH		11	NA	NA	NA
<i>Results reported in mg/L (ppb).            ND = Not detected.            Split cells indicate duplicate analyses.            Boldface type indicates PGQS exceedances.            NA = Not applicable no boring installed.            NT = Not tested for.</i>						

## 5.0 Risk Evaluation

### 5.1 Potential Sources

Only low levels of TPH were detected in a groundwater sample from the monitoring well located in the tank grave. It is reasonably clear that the source of this contamination is related to the fuel oil UST which has been removed from the site. Approximately 15 cubic yards of soil were excavated and polyencapsulated at the Department of Public Works Yard located on Fairground Road. This additional source of contamination was stockpiled off-site due to the sensitive nature of the well field.

### 5.2 Potential Receptors

The potential sensitive receptors of most immediate concern are site workers. The Brattleboro Well Field Water Treatment Building is located approximately 3 feet topographically and hydrogeologically downgradient from the tank grave. The municipal water supply well is located downgradient 120 feet from the tank grave. There are no other water supplies known to be located within a ½ mile radius of the site. The only downgradient structure is the Well Field Treatment building, located between the tank grave and the West River. Air in the building was screened for VOCs with a PID. No VOCs were detected in the building above 0.1 ppmv.

The West River, located approximately 300 feet downgradient and to the east, is the nearest potential sensitive environmental receptor.

## 6.0 Conclusions and Recommendations

### 6.1 Conclusions

ECS presents the following conclusions based on the information obtained at the site to date:

- Groundwater flow direction at the site can be interpreted to be to the east, in the same direction as the West River.
- Low levels of contaminants tested for were detected in groundwater from the monitoring well installed in the tank grave of the fuel oil UST removed from the site in July 1999. No PGQS levels were exceeded in groundwater from the monitoring well or soil borings.
- Soil boring and associated groundwater samples did not detect any concentrations of VOCs or TPH above the minimum detection limits.
- No bedrock is located in the tank grave, groundwater is within 7 feet bgs, and no confining layer was present.
- No VOCs were detected in the indoor air of the site building, the nearest downgradient structure from the tank grave.
- The probable source of the release, a 1,500 gallon fuel oil UST, has been removed from the site. Presently, contamination of soil and groundwater appears to have been restricted to the tank grave.
- The water supply wells are presently tested on a quarterly basis for VOCs via EPA Method 524.5 drinking water standards under the direction of Tim Raymond at the VT DEC.

### 6.2 Recommendations

ECS recommends that the monitoring well at this site be sampled again in the spring time, when groundwater elevations are highest. Results from the quarterly water supply well sampling should be obtained by the Sites Management Section of the VT DEC for inclusion in the UST release file.

ECS recommends that samples from the polyencapsulated soil stockpile be screened for VOCs with a PID, in the summer of 2000 to assess contaminant levels in the pile and determine whether they may be thin spread on site.

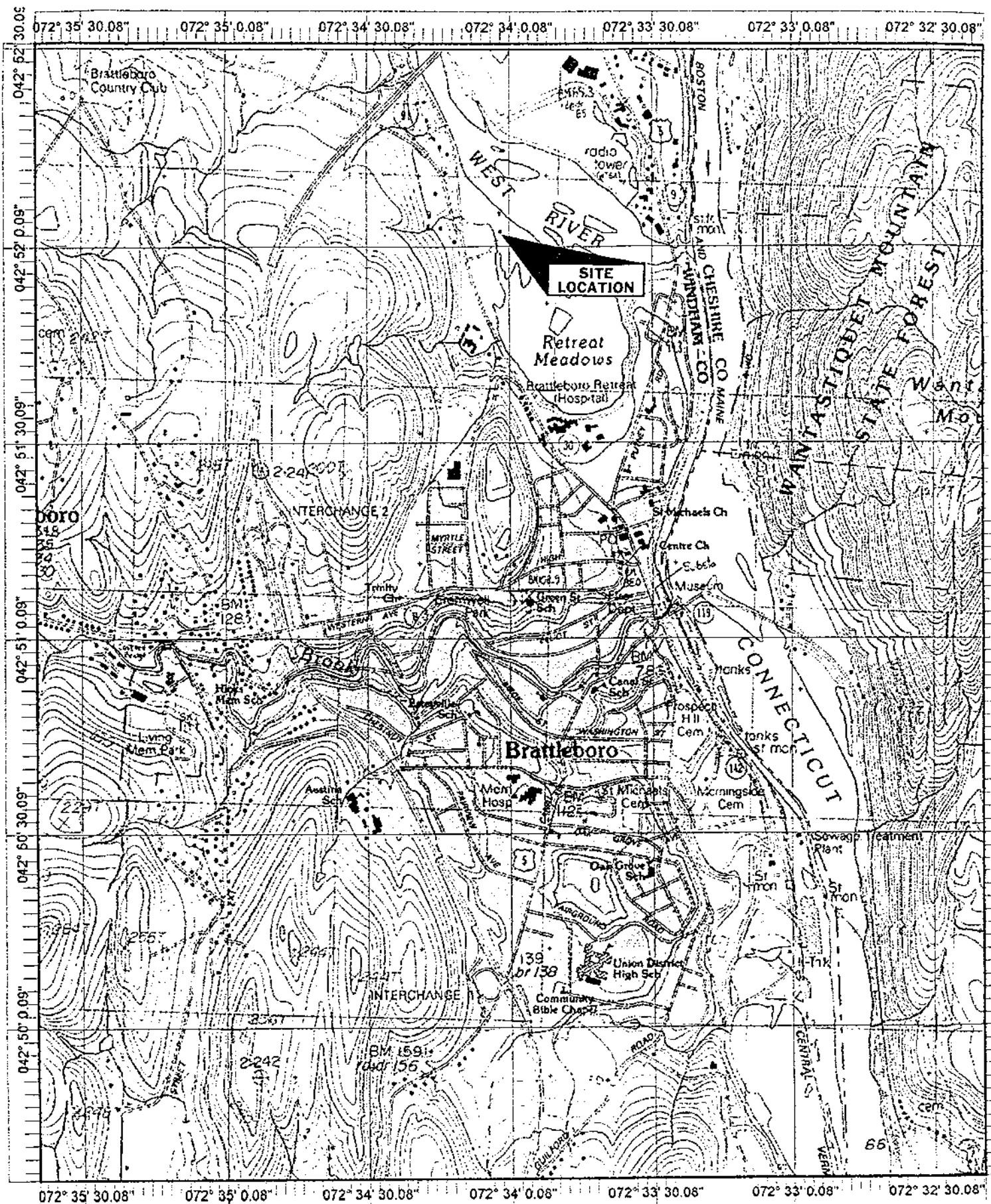
Pending the results of the next sampling round the site maybe considered for a Sites Management Activities Completion designation (SMAC).

*Concur*

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*Appendix A*  
*Site Locus Map*



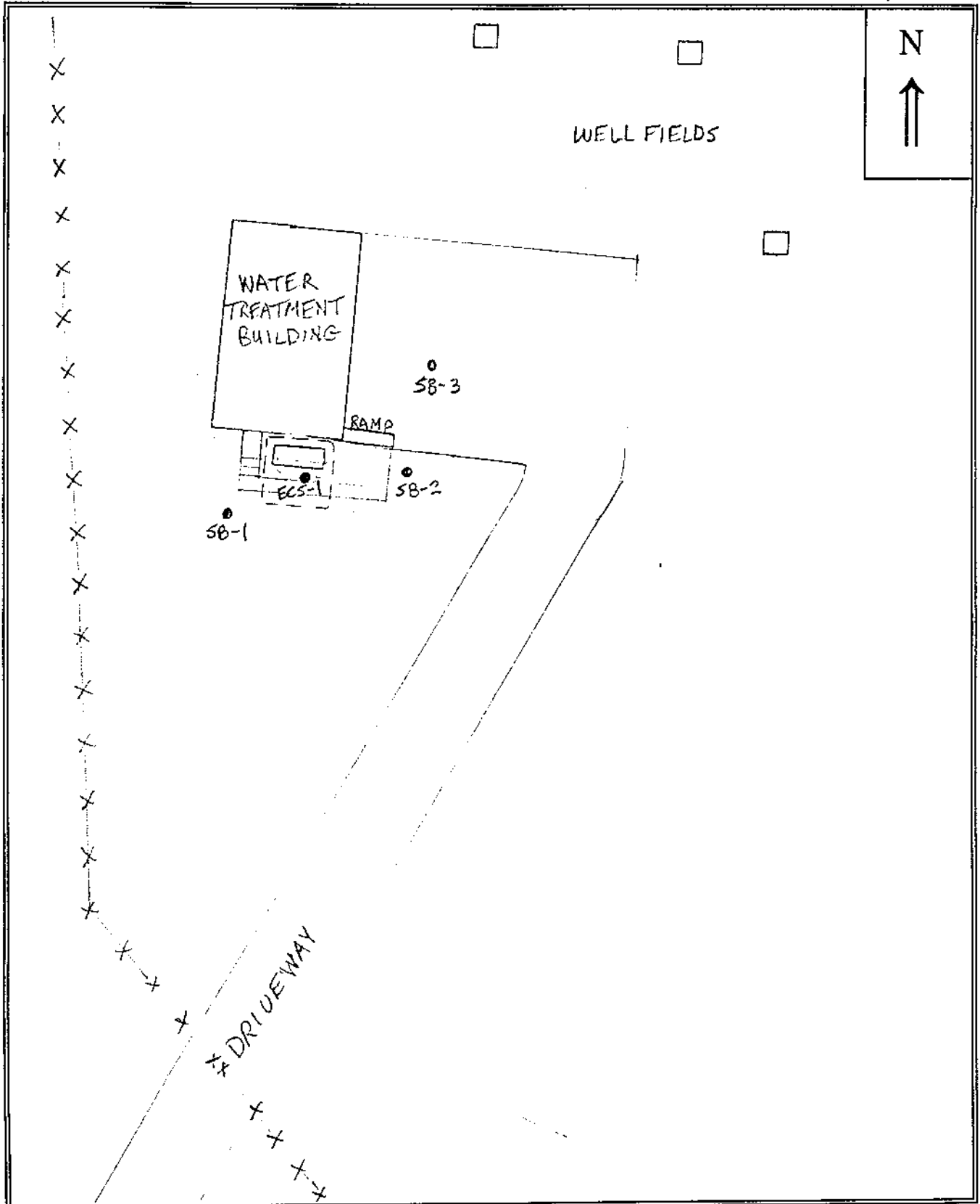


Name: BRATTLEBORO  
 Date: 7/21/99  
 Scale: 1 inch equals 2000 feet

Location: 042° 51' 03.8" N 072° 33' 59.7" W  
 Caption: Brattleboro D.P.W. Well Fields  
 Route 30  
 Brattleboro, VT 05301

*Appendix B*

*Site Plan*



Site Sketch	Not to Scale	Brattleboro Town Well Fields Route 30 Brattleboro, Vermont
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*Appendix C*  
*Soil Boring Logs*

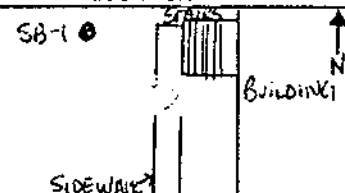


Environmental Compliance Services, Inc.  
157 Old Guilford Rd., #6, Brattleboro, Vermont 05301

SOIL BORING and MONITORING WELL  
INSTALLATION LOG

BORING NO.: SB-1  
DOCUMENT NO.:  
SHEET 1 OF 1

LOCATION



BORING COMPANY: Environmental Compliance Services, Inc.  
BORING COMPANY ADDRESS: 588 Silver Street, Agawam, Massachusetts  
FOREMAN: Dominique Cardinale  
ECS INSPECTOR: L. Gilmore  
JOB NUMBER: 40191.00  
PROJECT NAME: Brattleboro DPW  
PROJECT ADDRESS: Rte 30 Brattleboro, VT  
CLIENT NAME: Steve Barrett

GROUNDWATER OBSERVATIONS			CASING	SAMPLER	CORE BARREL	Casing Elevation (ft.)	PVC Elevation (ft.)	Surface Elevation (ft.)	Date Started	Date Completed
Date	Depth	Stabilization Time	TYPE	Macro					9/9/99	9/9/99
			INSIDE DIAMETER	1.5						
			HAMMER WEIGHT	Direct Drive						
			HAMMER FALL							
NOTES:			Sampled using EarthProbe							

Depth	Sample Number	Sample Depths	Penetration/ Recovery	Blows per 6" penetration	Strata Changes	Soil Descriptions	Well As Built	Field Testing (1)	Notes
0		0 - 4	4 1/4"		f. SAND and SILT	Brown fine SAND and SILT, trace Cobbles		BOL	
4		4 - 8	4 1/4"			Brown fine SAND and SILT, trace Cobbles		3.5	
8		8 - 12	4 1/3.5"		m. SAND	Brown m.-f. SAND and SILT		7.0	
12		12 - 16			End of Boring			2	
16		16 - 20							
20		20 - 24							
24		24 - 28							
28		28 - 32							

- Field testing values represent total volatile organic vapors (referenced to a benzene standard) measured in the headspace of sealed soil sample jars or Zip-lock™ bags, with a Photovac Model 2020 photoionization detector (PID). Results reported in parts per million by volume (ppmv). Detection limit calibrated to 0.2 ppmv.
- Water Table encountered at approximately 11' BGS.

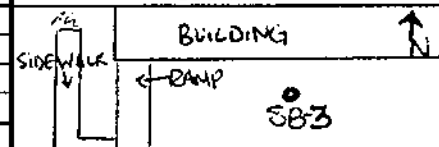


Environmental Compliance Services, Inc.  
157 Old Guilford Rd., #6, Brattleboro, Vermont 05301

SOIL BORING and MONITORING WELL  
INSTALLATION LOG

BORING NO.: SB-3  
DOCUMENT NO.:  
SHEET 1 OF 1

LOCATION



BORING COMPAN: Environmental Compliance Services, Inc.  
BORING COMPANY: 588 Silver Street, Agawam, Massachusetts  
FOREMAN: Dominique Cardinale  
ECS INSPECTOR: L. Gilmore  
JOB NUMBER: 40191.00  
PROJECT NAME: Brattleboro DPW  
PROJECT ADDRESS: Rte 30 Brattleboro, VT  
CLIENT NAME: Steve Barrett

GROUNDWATER OBSERVATIONS				CASING	SAMPLER	CORE BARREL
Date	Depth	Stabilization Time	TYPE		Macro	
			INSIDE DIAMETER		1.5	
			HAMMER WEIGHT		Direct Drive	
			HAMMER FALL			
NOTES:				Sampled using EarthProbe		


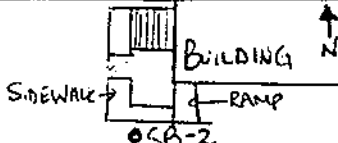
Casing Elevation (ft.)  
PVC Elevation (ft.)  
Surface Elevation (ft.)  
Date Started: 9/9/99  
Date Completed: 9/9/99

Depth	Sample Number	Sample Depths	Penetration/ Recovery	Blows per 6" penetration	Strata Changes	Soil Descriptions	Well As Built	Field Testing (1)	Notes
0	S-1	0 - 4	4'3.5'		m. SAND	brown m.-f. SAND, some Cobbles, trace O.M.		5.1	
					f. SAND				
4	S-2	4 - 8	4'3.5'		m.-f. SAND	brown m.-f. SAND, some Cobbles and Silt		9.6	
8	S-3	8 - 12	4'3.5'		m. SAND	Brown m.-f. SAND and SILT		18.7	
					f. SAND and SILT				2
					SILT				3
12		12 - 16			End of Boring				
16		16 - 20							
20		20 - 24							
24		24 - 28							
28		28 - 32							

1. Field testing values represent total volatile organic vapors (referenced to a benzene standard) measured in the headspace of sealed soil sample jars or Zip-lock™ bags, with a Photovac Model 2020 photoionization detector (PID). Results reported in parts per million by volume (ppmv). Detection limit calibrated to 0.2 ppmv.

2. Areas of possible staining detected at 10' BGS

3. Water Table encountered at approximately 10' BGS

 <b>Environmental Compliance Services, Inc.</b> 157 Old Guilford Rd., #6, Brattleboro, Vermont 05301				<b>SOIL BORING and MONITORING WELL INSTALLATION LOG</b>				BORING NO.: SB-2 DOCUMENT NO.: SHEET 1 OF 1	
BORING COMPAN: Environmental Compliance Services, Inc. BORING COMPANY: 588 Silver Street, Agawam, Massachusetts FOREMAN: Dominique Cardinale ECS INSPECTOR: L. Gilmore				JOB NUMBER: 40191.00 PROJECT NAME: Brattleboro DPW PROJECT ADDRESS: Rte 30 Brattleboro, VT CLIENT NAME: Steve Barrett				LOCATION 	
<b>GROUNDWATER OBSERVATIONS</b>				<b>CASING</b>		<b>SAMPLER</b>		<b>CORE BARREL</b>	
Date	Depth	Stabilization Time	TYPE		Macro		Casing Elevation (ft.)		
			INSIDE DIAMETER		1.5		PVC Elevation (ft.)		
			HAMMER WEIGHT		Direct Drive		Surface Elevation (ft.)		
			HAMMER FALL				Date Started	9/9/99	
			NOTES:	Sampled using EarthProbe			Date Completed	9/9/99	
Depth	Sample Number	Sample Depths	Penetration/ Recovery	Blows per 6" penetration	Strata Changes	Soil Descriptions	Well As Built	Field Testing (u)	Notes
0	S-1	0 - 4	4'4"		Organic Matter m. SAND&COBBLE	brown m.-f. SAND, some Cobbles, trace O.M.		5.1	
4	S-2	4 - 8	4'3.5"		m.-f. SAND	brown m.-f. SAND, some Cobbles and Silt		9.6	
8	S-3	8 - 12	4'3.5"		f. SAND and SILT Cobbles	Brown m.-f. SAND and SILT		18.7	
					f. SAND				2
					SILT				3
12		12 - 16			f. SAND and SILT End of Boring				
16		16 - 20							
20		20 - 24							
24		24 - 28							
28		28 - 32							

1. Field testing values represent total volatile organic vapors (referenced to a benzene standard) measured in the headspace of sealed soil sample jars or Zip-lock™ bags, with a Photovac Model 2020 photoionization detector (PID). Results reported in parts per million by volume (ppmv). Detection limit calibrated to 0.2 ppmv.

2. Areas of possible staining detected at 9' BGS

3. Water Table encountered at approximately 10' BGS

*Appendix D*

*Laboratory Data Sheets and Chain of Custody Record*





SPECTRUM ANALYTICAL, INC.

Massachusetts Certification M-MA 138  
Connecticut Approval # PH 0777  
Rhode Island # 98 & Maine # n/a  
New Hampshire ID # 2538  
New York ID #11393  
Florida HRS87448

RECEIVED AUG - 9 1999

ECS, Inc.  
157 Old Guilford Road, #6  
Brattleboro, VT 05301

August 4, 1999

Attn: David Balk

Client Project No.: 40191

Location: Brattleboro DPW Wellfields-VT

<u>Lab ID No.:</u>	<u>Client ID</u>	<u>Analysis Requested</u>
AB51541	ECS-1	EPA Method 8021B TPH by GC
AB51542	TRIP	EPA Method 8021B

Authorized by

Manibal Tayeh  
President/Laboratory Director

ENVIRONMENTAL ANALYSES

11 Almgren Drive • Agawam, Massachusetts 01001 • 413-789-9018 • FAX 413-789-4076

# SPECTRUM ANALYTICAL, INC.

## Laboratory Report

Client ID: **ECS-1**  
Lab ID No: **AB51541**

Location: **Brattleboro DPW Wellfields-VT**  
Client Job No: **40191**

Matrix: **Ground Water**  
Sampled on **07/29/99** Client **ECS**  
Received on **07/30/99** by **KC**  
QC and Data Review by **MD**

Preservative: **Refrigeration, HCl**  
Container: **2 VOA Vials**  
Condition of Sample as Received: **Satisfactory**  
Delivered by: **Client**

### Volatile Organics

SW846 Method 8021B

Parameter for AB51541	Result (in ug/L)	MDL	Analyzed	Analyst
Benzene	Not detected	1.0	08/03/99	SK
Toluene	Not detected	1.0	08/03/99	SK
Ethylbenzene	Not detected	1.0	08/03/99	SK
m,p-Xylenes	Not detected	2.0	08/03/99	SK
o-Xylene	Not detected	1.0	08/03/99	SK
Naphthalene	Not detected	1.0	08/03/99	SK
1,2,4-Trimethylbenzene	Not detected	1.0	08/03/99	SK
1,3,5-Trimethylbenzene	Not detected	1.0	08/03/99	SK
Methyl-t-butyl ether	Not detected	1.0	08/03/99	SK
Bromofluorobenzene (%SR)	92		08/03/99	SK

# SPECTRUM ANALYTICAL, INC.

## Laboratory Report

Client ID: ECS-1  
Lab ID No.: AB51541

Location: Brattleboro DPW Wellfields-VT  
Client Job No.: 40191

Matrix: Ground Water  
Collected: 07/29/99 by ECS  
Received on 07/30/99 by KC  
QC and Data Review by MD

Preservative: Refrigeration  
Container: 1 Amber Glass  
Condition of Sample as Received: Satisfactory  
Delivered by: Client

### Total Hydrocarbons by GC

Modified EPA Method 8100

Parameter	Result (mg/L)	MDL	Extracted	Analyzed	Analyst
Total Hydrocarbons (GC)	11		08/02/99	08/03/99	LR

### Fingerprint based quantification:

Gasoline	Not detected	0.2	08/02/99	08/03/99	LR
Fuel Oil #2	Not detected	0.4	08/02/99	08/03/99	LR
Fuel Oil #4	Not detected	0.7	08/02/99	08/03/99	LR
Fuel Oil #6	Not detected	0.7	08/02/99	08/03/99	LR
Motor Oil	*	0.7	08/02/99	08/03/99	LR
Ligroin	Not detected	0.4	08/02/99	08/03/99	LR
Aviation Fuel	Not detected	0.4	08/02/99	08/03/99	LR
Other Oil	**	0.7	08/02/99	08/03/99	LR
Unidentified	11		08/02/99	08/03/99	LR

Petroleum identification is determined by comparing the GC fingerprint obtained from the sample with a library of GC fingerprints obtained from petroleum products. Possible match categories are as follows;

- Gasoline - includes regular, unleaded, premium, etc.
- Fuel Oil #2 - includes home heating oil, #2 fuel oil and diesel.
- Fuel Oil #4 - Includes #4 Fuel Oil.
- Fuel Oil #6 - includes #6 oil and bunker "C" oil.
- Motor Oil - includes virgin and waste automobile.
- Ligroin - includes mineral spirits, petroleum naphtha, vm&p naphtha.
- Aviation Fuels - includes Kerosene, Jet A and JP-4.
- Other Oil - includes lubricating and cutting oil and silicon oil.

Factors such as microbial degradation, weathering and solubility generally prevent specific identification within a petroleum category. A finding of "unidentified" means that the sample fingerprint was characteristic of a petroleum product, but could not be matched to a fingerprint in the library.

After fingerprint identification, the amount present in the sample is quantified using a calibration curve prepared from a petroleum product of the same category as the identified petroleum. Unidentified petroleum is quantified using a petroleum calibration that approximates the distribution of compounds in the sample.

A \* in the results column indicates the petroleum calibration used to quantify unidentified samples.

# SPECTRUM ANALYTICAL, INC.

## Laboratory Report

Client ID: TRIP  
Lab ID No: AB51542

Location: Brattleboro DPW Wellfields-VT  
Client Job No: 40191

Matrix: Deionized Water  
Sampled on 07/29/99 Client ECS  
Received on 07/30/99 by KC  
QC and Data Review by MD

Preservative: Refrigeration, HCl  
Container: 1 VOA Vial  
Condition of Sample as Received: Satisfactory  
Delivered by: Client

### Volatile Organics

SW846 Method 8021B

Parameter for AB51542	Result (in ug/L)	MDL	Analyzed	Analyst
Benzene	Not detected	1.0	08/03/99	SK
Toluene	Not detected	1.0	08/03/99	SK
Ethylbenzene	Not detected	1.0	08/03/99	SK
m,p-Xylenes	Not detected	2.0	08/03/99	SK
o-Xylene	Not detected	1.0	08/03/99	SK
Naphthalene	Not detected	1.0	08/03/99	SK
1,2,4-Trimethylbenzene	Not detected	1.0	08/03/99	SK
1,3,5-Trimethylbenzene	Not detected	1.0	08/03/99	SK
Methyl-t-butyl ether	Not detected	1.0	08/03/99	SK
Bromofluorobenzene (%SR)	75		08/03/99	SK

# Spectrum Analytical, Inc.

## Laboratory Report Supplement

### References

- Methods for the Determination of Organic Compounds in Drinking Water. EPA-600/4-88/039. EMSL 1988.
- Methods for Chemical Analysis of Water and Wastes. EPA 600/4-79-020. EMSL 1983.
- Methods for Organic Chemical Analysis of Municipal and Industrial Wastewater. EPA 600/4-82-057. EMSL 1982.
- Test Methods for Evaluating Solid Waste. Physical/Chemical Methods. EPA SW-846. 1986.
- Standard Methods for the Examination of Water and Wastes. APHA-AWWA-WPCF. 19th Edition. 1995.
- Standard Methods for Comparison of Waterborne Petroleum Oils by Gas Chromatography. ASTM D 3328. 1982.
- Oil Spill Identification System. U.S. Coast Guard CG-D-52-77. 1977.
- Handbook for Analytical Quality Control in Water and Wastewater Laboratories. EPA 600/4-79-019. EMSL 1979.
- Choosing Cost-Effective QA/QC (Quality Assurance/Quality Control) Programs for Chemical Analyses. EPA 600/4-85/056. EMSL 1985.

### Report Notations

Not Detected,	=	<i>The compound was not detected at a concentration equal to or above</i>	
Not Det, ND or nd		<i>the established method detection limit.</i>	
NC	=	<i>Not Calculated</i>	
MCL	=	<i>EPA Maximum Contamination Level</i>	
VOA	=	<i>Volatile Organic Analysis</i>	
BFB	=	<i>4-Bromofluorobenzene</i>	<i>(An EPA 624 Surrogate)</i>
p-DFB	=	<i>1,4-Difluorobenzene</i>	<i>(An EPA 624 Surrogate)</i>
CLB-d5	=	<i>Chlorobenzene-d5</i>	<i>(An EPA 624 Surrogate)</i>
BCP	=	<i>2-Bromo-1-chloropropane</i>	<i>(An EPA 601 Surrogate)</i>
TFT	=	<i>a,a,a-Trifluorotoluene</i>	<i>(An EPA 602 Surrogate)</i>
Decachlorobiphenyl	=	<i>(an EPA 608/8080 Surrogate)</i>	

### Definitions

**Surrogate Recovery** = The recovery (expressed as a percent) of a non-method analyte (see surrogates listed above) added to the sample for the purpose of monitoring system performance.

**Matrix Spike Recovery** = The recovery (expressed as a percent) of method analytes added to the sample for the purpose of determining any effect of sample composition on analyte recovery.

**Laboratory Replicate** = Two sample aliquots taken in the analytical laboratory and analyzed separately with identical procedures. Analyses of laboratory duplicates give a measure of the precision associated with laboratory procedures, but not with sample collection, preservation, or storage procedures.

**Field Duplicate** = Two separate samples collected at the same time and place under identical circumstances and treated exactly the same throughout field and laboratory procedures. Analysis of Field duplicates give a measure of the precision associated with sample collection, preservation and storage, as well as with laboratory procedures.

**Relative Percent Difference (% RPD)** = The precision measurement obtained on duplicate/replicate analyses. %RPD is calculated as:

$$\%RPD = \frac{(\text{value1} - \text{value2})}{\text{ave. value}} * 100\%$$



# CHAIN OF CUSTODY RECORD

Special Handling:

- ☐ Standard TAT - 7 to 10 business days
- ☒ Rush TAT - Date Needed: 8/4/99
- All TATs subject to laboratory approval; min. 24 hour notification needed for rushes.
- Samples disposed of after 60 days unless otherwise instructed.

Page 1 of 1

Report To: <u>ECS Bratt</u>	Invoice To: <u>ECS</u>	Project No.: <u>40191</u>
		Site Name: <u>Battleboro D.P.W. Wellfields</u>
		Location: <u>Route 30</u> State: <u>VT</u>
Project Mgr.: <u>Dave Balk</u>	P.O. No.: _____ RQN: <u>2727</u>	Sampler(s): <u>L. GILMORE</u>

1=4°C 2=HCl 3=H<sub>2</sub>SO<sub>4</sub> 4=HNO<sub>3</sub> 5=NaOH 6=MeOH 7=\_\_\_\_\_

DW=Drinking Water GW=Ground Water WW=Waste Water  
SO=Soil SL=Sludge O=Oil X1=DH2O X2=\_\_\_\_\_

G=Grab C=Composite

Lab Id:	Sample Id:	Date:	Time:	Type	Matrix	Preservative	pH	# Of VOA Vials	# Of Amber Glass	# Of Clear Glass	# Of Plastic	Containers:	Analyses:	Notes:
AB <u>51541</u>	<u>ECS-1</u>	<u>7/29/99</u>	<u>1:30</u>	<u>G</u>	<u>GW</u>	<u>12</u>		<u>2</u>	<u>1</u>			<u>80218 VTBW 50m</u>	<u>X</u>	
AB <u>51542</u>	<u>TRIP</u>	<u>7/29/99</u>	<u>12:25</u>	<u>G</u>	<u>SL</u>	<u>12</u>		<u>1</u>				<u>80018 HLL</u>	<u>X</u>	
AB														
AB														
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AB														

Additional Instructions: <u>Rush Analysis</u>	Relinquished By: <u>J. Smitten</u>	Received By: <u>M. D. D.</u>	Date: <u>7/30/99</u>	Time: <u>1510</u>
	<input checked="" type="checkbox"/> Fax results when available to (802) <u>257-1603</u>			



SPECTRUM ANALYTICAL, INC.

Massachusetts Certification M-MA 138  
Connecticut Approval # PH 0777  
Rhode Island # 98 & Maine # n/a  
New Hampshire ID # 2538  
New York ID #11393  
Florida HRS87448

*ECS, Inc.  
157 Old Guilford Road, #6  
Brattleboro, VT 05301*

*August 9, 1999*

*Attn: David Balk*

Client Project No.: 40191

Location: **Brattleboro D.P.W. - VT**

---

<u>Lab ID No.</u>	<u>Client ID</u>	<u>Analysis Requested</u>
AB51345	ECS-1	TPH by GC Aromatic and Halogenated VOCs

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Authorized by

  
Hanibal Tayeh  
President/Laboratory Director

ENVIRONMENTAL ANALYSES

**SPECTRUM ANALYTICAL, INC.**

## Laboratory Report

Client ID: ECS-1  
Lab ID No: AB51345

Location: Brattleboro D.P.W. - VT  
Client Job No: 40191

Matrix: Soil  
Collected: 07/22/99 by ECS  
Received on 07/27/99 by KC  
QC and Data Review by MD

Preservative: Refrigeration  
Container: 1 Amber Glass  
Condition of Sample as Received: Satisfactory  
Delivered by: Courier

Parameter	Result	MDL	Units	Method	Analyzed	Analyst
Benzene	Not detected	11.0	ug/L	SW846 8021B	08/01/99	GW
Toluene	Not detected	11.0	ug/L	SW846 8021B	08/01/99	GW
Ethylbenzene	Not detected	11.0	ug/L	SW846 8021B	08/01/99	GW
m,p-Xylenes	Not detected	22.0	ug/L	SW846 8021B	08/01/99	GW
o-Xylene	Not detected	11.0	ug/L	SW846 8021B	08/01/99	GW
Naphthalene	Not detected	11.0	ug/L	SW846 8021B	08/01/99	GW
1,2,4-Trimethylbenzene	Not detected	11.0	ug/L	SW846 8021B	08/01/99	GW
1,3,5-Trimethylbenzene	Not detected	11.0	ug/L	SW846 8021B	08/01/99	GW
Methyl-t-butyl ether	Not detected	11.0	ug/L	SW846 8021B	08/01/99	GW
BFB Surrogate Recovery (%)	105		ug/L	SW846 8021B	08/01/99	GW
% Solids	90.3	0.1	%	EPA 160.3	08/01/99	SMS



# SPECTRUM ANALYTICAL, INC.

## Laboratory Report

Client ID: ECS-1  
Lab ID No.: AB51345

Location: Brattleboro D.P.W. - VT  
Client Job No.: 40191

Matrix: Soil  
Collected: 07/22/99 by ECS  
Received on 07/27/99 by KC  
QC and Data Review by MD

Preservative: Refrigeration  
Container: 1 Amber Glass  
Condition of Sample as Received: Satisfactory  
Delivered by: Courier

### Total Hydrocarbons by GC

Modified EPA Method 8100

Parameter	Result (mg/Kg)	MDL	Extracted	Analyzed	Analyst
Total Hydrocarbons (GC)	Not detected		08/02/99	08/02/99	LR

### Fingerprint based quantification:

Gasoline	Not detected	40	08/02/99	08/02/99	LR
Fuel Oil #2	Not detected	40	08/02/99	08/02/99	LR
Fuel Oil #4	Not detected	40	08/02/99	08/02/99	LR
Fuel Oil #6	Not detected	80	08/02/99	08/02/99	LR
Motor Oil	Not detected	80	08/02/99	08/02/99	LR
Ligroin	Not detected	40	08/02/99	08/02/99	LR
Aviation Fuel	Not detected	40	08/02/99	08/02/99	LR
Other Oil	Not detected	80	08/02/99	08/02/99	LR
Unidentified	Not detected		08/02/99	08/02/99	LR
% Solids	90.3	0.1	08/01/99	08/01/99	SMS

Petroleum identification is determined by comparing the GC fingerprint obtained from the sample with a library of GC fingerprints obtained from petroleum products. Possible match categories are as follows;

Gasoline - includes regular, unleaded, premium, etc.

Fuel Oil #2 - includes home heating oil, #2 fuel oil and diesel.

Fuel Oil #4 - Includes #4 Fuel Oil.

Fuel Oil #6 - includes #6 oil and bunker "C" oil.

Motor Oil - includes virgin and waste automobile.

Ligroin - includes mineral spirits, petroleum naphtha, vm&p naphtha.

Aviation Fuels - includes Kerosene, Jet A and JP-4.

Other Oil - includes lubricating and cutting oil and silicon oil.

Factors such as microbial degradation, weathering and solubility generally prevent specific identification within a petroleum category. A finding of "unidentified" means that the sample fingerprint was characteristic of a petroleum product, but could not be matched to a fingerprint in the library.

After fingerprint identification, the amount present in the sample is quantified using a calibration curve prepared from a petroleum product of the same category as the identified petroleum. Unidentified petroleum is quantified using a petroleum calibration that approximates the distribution of compounds in the sample.

A \* in the results column indicates the petroleum calibration used to quantify unidentified samples.

# Spectrum Analytical, Inc.

## Laboratory Report Supplement

### References

- Methods for the Determination of Organic Compounds in Drinking Water. EPA-600/4-88/039. EMSL 1988.
- Methods for Chemical Analysis of Water and Wastes. EPA 600/4-79-020. EMSL 1983.
- Methods for Organic Chemical Analysis of Municipal and Industrial Wastewater. EPA 600/4-82-057. EMSL 1982.
- Test Methods for Evaluating Solid Waste. Physical/Chemical Methods. EPA SW-846. 1986.
- Standard Methods for the Examination of Water and Wastes. APHA-AWWA-WPCF. 19th Edition. 1995.
- Standard Methods for Comparison of Waterborne Petroleum Oils by Gas Chromatography. ASTM D 3328. 1982.
- Oil Spill Identification System. U.S. Coast Guard CG-D-52-77. 1977.
- Handbook for Analytical Quality Control in Water and Wastewater Laboratories. EPA 600/4-79-019. EMSL 1979.
- Choosing Cost-Effective QA/QC (Quality Assurance/Quality Control) Programs for Chemical Analyses. EPA 600/4-85/056. EMSL 1985.

### Report Notations

Not Detected,	=	The compound was not detected at a concentration equal to or above	
Not Det, ND or nd		the established method detection limit.	
NC	=	Not Calculated	
MCL	=	EPA Maximum Contamination Level	
VOA	=	Volatile Organic Analysis	
BFB	=	4-Bromofluorobenzene	(An EPA 624 Surrogate)
p-DFB	=	1,4-Difluorobenzene	(An EPA 624 Surrogate)
CLB-d5	=	Chlorobenzene-d5	(An EPA 624 Surrogate)
BCP	=	2-Bromo-1-chloropropane	(An EPA 601 Surrogate)
TFT	=	a,a,a-Trifluorotoluene	(An EPA 602 Surrogate)
Decachlorobiphenyl	=	(an EPA 608/8080 Surrogate)	

### Definitions

**Surrogate Recovery** = The recovery (expressed as a percent) of a non-method analyte (see surrogates listed above) added to the sample for the purpose of monitoring system performance.

**Matrix Spike Recovery** = The recovery (expressed as a percent) of method analytes added to the sample for the purpose of determining any effect of sample composition on analyte recovery.

**Laboratory Replicate** = Two sample aliquots taken in the analytical laboratory and analyzed separately with identical procedures. Analyses of laboratory duplicates give a measure of the precision associated with laboratory procedures, but not with sample collection, preservation, or storage procedures.

**Field Duplicate** = Two separate samples collected at the same time and place under identical circumstances and treated exactly the same throughout field and laboratory procedures. Analysis of Field duplicates give a measure of the precision associated with sample collection, preservation and storage, as well as with laboratory procedures.

**Relative Percent Difference (% RPD)** = The precision measurement obtained on duplicate/replicate analyses. %RPD is calculated as:

$$\%RPD = \frac{(\text{value1} - \text{value2})}{\text{ave. value}} * 100\%$$



# CHAIN OF CUSTODY RECORD

Page 1 of 1

07291516

## Special Handling:

- ☒ Standard TAT - 7 to 10 business days
- ☐ Rush TAT - Date Needed: \_\_\_\_\_
- All TATs subject to laboratory approval; min. 24 hour notification needed for rushes.
- Samples disposed of after 60 days unless otherwise instructed.

Report To: ECS BRATTLEBORO, VT

Invoice To: ECS

Project No.: 40191

Site Name: BRATTLEBORO D.P.W.

Location: Route 30, Brattleboro State: VT

Project Mgr.: DAVID BALK

P.O. No.: \_\_\_\_\_ RQN: 2727

Sampler(s): David Balk

1=4°C 2=HCl 3=H<sub>2</sub>SO<sub>4</sub> 4=HNO<sub>3</sub> 5=NaOH 6=MeOH 7=\_\_\_\_\_

DW=Drinking Water GW=Ground Water WW=Waste Water  
SO=Soil SL=Sludge O=Oil X1=\_\_\_\_\_ X2=\_\_\_\_\_

G=Grab C=Composite

								Containers:				Analyses:				Notes:	
Lab Id:	Sample Id:	Date:	Time:	Type	Matrix	Preservative	pH	# Of VOA Vials	# Of Amber Glass	# Of Clear Glass	# Of Plastic						
AB <u>51345</u>	<u>ECS-1</u>	<u>7/22/99</u>	<u>12:00</u>	<u>G</u>	<u>SO</u>	<u>1</u>		<u>2</u>				<u>8021 B VOCs</u>	<u>8100 M TPH</u>				
AB																	
AB																	
AB																	
AB																	
AB																	
AB																	
AB																	
AB																	
AB																	

Additional Instructions: VT SCAN VOCs

Relinquished By:

Received By:

Date:

Time:

*[Signature]*  
*[Signature]*

*[Signature]*

7/27/99 14:00  
7/27 16:00

☒ Fax results when available to (802) 257-1603



SPECTRUM ANALYTICAL, INC.

Massachusetts Certification M-MA 138  
Connecticut Approval # PH 0777  
Rhode Island # 98 & Maine # n/a  
New Hampshire ID # 2538  
New York ID #11393  
Florida HRS87448

RECEIVED OCT - 1 1999

*ECS, Inc.  
157 Old Guilford Road, #6  
Brattleboro, VT 05301*

*September 24, 1999*

*Attn: David Balk*

Client Project No.: 40191

Location: DPW/Rt 30 - Brattleboro, VT

<u>Lab ID No.</u>	<u>Client ID</u>	<u>Analysis Requested</u>
AB56336	SB-1	EPA Method 8021B TPH by GC
AB56337	SB-2	EPA Method 8021B TPH by GC
AB56338	SB-3	EPA Method 8021B TPH by GC
AB56339	DUP	EPA Method 8021B
AB56340	TRIP	EPA Method 8021B

Authorized by

Hanibal Tayeh  
President/Laboratory Director

ENVIRONMENTAL ANALYSES

# SPECTRUM ANALYTICAL, INC.

## Laboratory Report

Client ID: SB-1  
Lab ID No: AB56336

Location: DPW/Rt 30 - Brattleboro, VT  
Client Job No: 40191

Matrix: Ground Water  
Sampled on 09/09/99 Client ECS  
Received on 09/09/99 by KC  
QC and Data Review by DDR

Preservative: Refrigeration, HCl  
Container: 2 VOA Vials  
Condition of Sample as Received: Satisfactory  
Delivered by: Courier

### Volatile Organics

SW846 Method 8021B

Parameter for AB56336	Result (in ug/L)	MDL	Analyzed	Analyst
Benzene	Not detected	1.0	09/21/99	GW
Toluene	Not detected	1.0	09/21/99	GW
Ethylbenzene	Not detected	1.0	09/21/99	GW
m,p-Xylenes	Not detected	2.0	09/21/99	GW
o-Xylene	Not detected	1.0	09/21/99	GW
Naphthalene	Not detected	1.0	09/21/99	GW
1,2,4-Trimethylbenzene	Not detected	1.0	09/21/99	GW
1,3,5-Trimethylbenzene	Not detected	1.0	09/21/99	GW
Methyl-t-butyl ether	Not detected	1.0	09/21/99	GW
Bromofluorobenzene (%SR)	96		09/21/99	GW

# SPECTRUM ANALYTICAL, INC.

## Laboratory Report

Client ID: SB-1  
Lab ID No.: AB56336

Location: DPW/Rt 30 - Brattleboro, VT  
Client Job No.: 40191

Matrix: Ground Water  
Collected: 09/09/99 by ECS  
Received on 09/09/99 by KC  
QC and Data Review by DDR

Preservative: Refrigeration  
Container: 1 Amber Glass  
Condition of Sample as Received: Satisfactory  
Delivered by: Courier

### Total Hydrocarbons by GC

Modified EPA Method 8100

Parameter	Result (mg/L)	MDL	Extracted	Analyzed	Analyst
Total Hydrocarbons (GC)	Not detected		09/15/99	09/17/99	LR

### Fingerprint based quantification:

Gasoline	Not detected	0.2	09/15/99	09/17/99	LR
Fuel Oil #2	Not detected	0.4	09/15/99	09/17/99	LR
Fuel Oil #4	Not detected	0.7	09/15/99	09/17/99	LR
Fuel Oil #6	Not detected	0.7	09/15/99	09/17/99	LR
Motor Oil	Not detected	0.7	09/15/99	09/17/99	LR
Ligroin	Not detected	0.4	09/15/99	09/17/99	LR
Aviation Fuel	Not detected	0.4	09/15/99	09/17/99	LR
Other Oil	Not detected	0.7	09/15/99	09/17/99	LR
Unidentified	Not detected		09/15/99	09/17/99	LR

Petroleum identification is determined by comparing the GC fingerprint obtained from the sample with a library of GC fingerprints obtained from petroleum products. Possible match categories are as follows;

- Gasoline - includes regular, unleaded, premium, etc.
- Fuel Oil #2 - includes home heating oil, #2 fuel oil and diesel.
- Fuel Oil #4 - Includes #4 Fuel Oil.
- Fuel Oil #6 - includes #6 oil and bunker "C" oil.
- Motor Oil - includes virgin and waste automobile.
- Ligroin - includes mineral spirits, petroleum naphtha, vm&p naphtha.
- Aviation Fuels - includes Kerosene, Jet A and JP-4.
- Other Oil - includes lubricating and cutting oil and silicon oil.

Factors such as microbial degradation, weathering and solubility generally prevent specific identification within a petroleum category. A finding of "unidentified" means that the sample fingerprint was characteristic of a petroleum product, but could not be matched to a fingerprint in the library.

After fingerprint identification, the amount present in the sample is quantified using a calibration curve prepared from a petroleum product of the same category as the identified petroleum. Unidentified petroleum is quantified using a petroleum calibration that approximates the distribution of compounds in the sample.

A \* in the results column indicates the petroleum calibration used to quantify unidentified samples.

# SPECTRUM ANALYTICAL, INC.

## Laboratory Report

Client ID: SB-2  
Lab ID No: AB56337

Location: DPW/Rt 30 - Brattleboro, VT  
Client Job No: 40191

Matrix: Ground Water  
Sampled on 09/09/99 Client ECS  
Received on 09/09/99 by KC  
QC and Data Review by MD

Preservative: Refrigeration, HCl  
Container: 2 VOA Vials  
Condition of Sample as Received: Satisfactory  
Delivered by: Courier

### Volatile Organics

SW846 Method 8021B

Parameter for AB56337	Result (in ug/L)	MDL	Analyzed	Analyst
Benzene	Not detected	1.0	09/21/99	GW
Toluene	Not detected	1.0	09/21/99	GW
Ethylbenzene	Not detected	1.0	09/21/99	GW
m,p-Xylenes	Not detected	2.0	09/21/99	GW
o-Xylene	Not detected	1.0	09/21/99	GW
Naphthalene	Not detected	1.0	09/21/99	GW
1,2,4-Trimethylbenzene	Not detected	1.0	09/21/99	GW
1,3,5-Trimethylbenzene	Not detected	1.0	09/21/99	GW
Methyl-t-butyl ether	Not detected	1.0	09/21/99	GW
Bromofluorobenzene (%SR)	91		09/21/99	GW

# SPECTRUM ANALYTICAL, INC.

## Laboratory Report

Client ID: SB-2  
Lab ID No.: AB56337

Location: DPW/Rt 30 - Brattleboro, VT  
Client Job No.: 40191

Matrix: Ground Water  
Collected: 09/09/99 by ECS  
Received on 09/09/99 by KC  
QC and Data Review by MD

Preservative: Refrigeration  
Container: 1 Amber Glass  
Condition of Sample as Received: Satisfactory  
Delivered by: Courier

### Total Hydrocarbons by GC

Modified EPA Method 8100

Parameter	Result (mg/L)	MDL	Extracted	Analyzed	Analyst
Total Hydrocarbons (GC)	Not detected		09/15/99	09/17/99	MB

### Fingerprint based quantification:

Gasoline	Not detected	0.2	09/15/99	09/17/99	MB
Fuel Oil #2	Not detected	0.4	09/15/99	09/17/99	MB
Fuel Oil #4	Not detected	0.7	09/15/99	09/17/99	MB
Fuel Oil #6	Not detected	0.7	09/15/99	09/17/99	MB
Motor Oil	Not detected	0.7	09/15/99	09/17/99	MB
Ligroin	Not detected	0.4	09/15/99	09/17/99	MB
Aviation Fuel	Not detected	0.4	09/15/99	09/17/99	MB
Other Oil	Not detected	0.7	09/15/99	09/17/99	MB
Unidentified	Not detected		09/15/99	09/17/99	MB

Petroleum identification is determined by comparing the GC fingerprint obtained from the sample with a library of GC fingerprints obtained from petroleum products. Possible match categories are as follows;

- Gasoline - includes regular, unleaded, premium, etc.
- Fuel Oil #2 - includes home heating oil, #2 fuel oil and diesel.
- Fuel Oil #4 - Includes #4 Fuel Oil.
- Fuel Oil #6 - includes #6 oil and bunker "C" oil.
- Motor Oil - includes virgin and waste automobile.
- Ligroin - includes mineral spirits, petroleum naphtha, vm&p naphtha.
- Aviation Fuels - includes Kerosene, Jet A and JP-4.
- Other Oil - includes lubricating and cutting oil and silicon oil.

Factors such as microbial degradation, weathering and solubility generally prevent specific identification within a petroleum category. A finding of "unidentified" means that the sample fingerprint was characteristic of a petroleum product, but could not be matched to a fingerprint in the library.

After fingerprint identification, the amount present in the sample is quantified using a calibration curve prepared from a petroleum product of the same category as the identified petroleum. Unidentified petroleum is quantified using a petroleum calibration that approximates the distribution of compounds in the sample.

A \* in the results column indicates the petroleum calibration used to quantify unidentified samples.



# SPECTRUM ANALYTICAL, INC.

## Laboratory Report

Client ID: SB-3  
Lab ID No: AB56338

Location: DPW/Rt 30 - Brattleboro, VT  
Client Job No: 40191

Matrix: Ground Water  
Sampled on 09/09/99 Client ECS  
Received on 09/09/99 by KC  
QC and Data Review by DDR

Preservative: Refrigeration, HCl  
Container: 2 VOA Vials  
Condition of Sample as Received: Satisfactory  
Delivered by: Courier

### Volatile Organics

SW846 Method 8021B

Parameter for AB56338	Result (in ug/L)	MDL	Analyzed	Analyst
Benzene	Not detected	1.0	09/21/99	GW
Toluene	Not detected	1.0	09/21/99	GW
Ethylbenzene	Not detected	1.0	09/21/99	GW
m,p-Xylenes	Not detected	2.0	09/21/99	GW
o-Xylene	Not detected	1.0	09/21/99	GW
Naphthalene	Not detected	1.0	09/21/99	GW
1,2,4-Trimethylbenzene	Not detected	1.0	09/21/99	GW
1,3,5-Trimethylbenzene	Not detected	1.0	09/21/99	GW
Methyl-t-butyl ether	Not detected	1.0	09/21/99	GW
Bromofluorobenzene (%SR)	91		09/21/99	GW

# SPECTRUM ANALYTICAL, INC.

## Laboratory Report

Client ID: SB-3  
Lab ID No.: AB56338

Location: DPW/Rt 30 - Brattleboro, VT  
Client Job No.: 40191

Matrix: Ground Water  
Collected: 09/09/99 by ECS  
Received on 09/09/99 by KC  
QC and Data Review by DDR

Preservative: Refrigeration  
Container: 1 Amber Glass  
Condition of Sample as Received: Satisfactory  
Delivered by: Courier

### Total Hydrocarbons by GC

Modified EPA Method 8100

Parameter	Result (mg/L)	MDL	Extracted	Analyzed	Analyst
Total Hydrocarbons (GC)	Not detected		09/15/99	09/17/99	MB

### Fingerprint based quantification:

Gasoline	Not detected	0.2	09/15/99	09/17/99	MB
Fuel Oil #2	Not detected	0.4	09/15/99	09/17/99	MB
Fuel Oil #4	Not detected	0.7	09/15/99	09/17/99	MB
Fuel Oil #6	Not detected	0.7	09/15/99	09/17/99	MB
Motor Oil	Not detected	0.7	09/15/99	09/17/99	MB
Ligroin	Not detected	0.4	09/15/99	09/17/99	MB
Aviation Fuel	Not detected	0.4	09/15/99	09/17/99	MB
Other Oil	Not detected	0.7	09/15/99	09/17/99	MB
Unidentified	Not detected		09/15/99	09/17/99	MB

Petroleum identification is determined by comparing the GC fingerprint obtained from the sample with a library of GC fingerprints obtained from petroleum products. Possible match categories are as follows;

- Gasoline - includes regular, unleaded, premium, etc.
- Fuel Oil #2 - includes home heating oil, #2 fuel oil and diesel.
- Fuel Oil #4 - Includes #4 Fuel Oil.
- Fuel Oil #6 - includes #6 oil and bunker "C" oil.
- Motor Oil - includes virgin and waste automobile.
- Ligroin - includes mineral spirits, petroleum naphtha, vm&p naphtha.
- Aviation Fuels - includes Kerosene, Jet A and JP-4.
- Other Oil - includes lubricating and cutting oil and silicon oil.

Factors such as microbial degradation, weathering and solubility generally prevent specific identification within a petroleum category. A finding of "unidentified" means that the sample fingerprint was characteristic of a petroleum product, but could not be matched to a fingerprint in the library.

After fingerprint identification, the amount present in the sample is quantified using a calibration curve prepared from a petroleum product of the same category as the identified petroleum. Unidentified petroleum is quantified using a petroleum calibration that approximates the distribution of compounds in the sample.

A \* in the results column indicates the petroleum calibration used to quantify unidentified samples.

# SPECTRUM ANALYTICAL, INC.

## Laboratory Report

Client ID: DUP  
Lab ID No: AB56339

Location: DPW/Rt 30 - Brattleboro, VT  
Client Job No: 40191

Matrix: Ground Water  
Sampled on 09/09/99 Client ECS  
Received on 09/09/99 by KC  
QC and Data Review by MD

Preservative: Refrigeration, HCl  
Container: 2 VOA Vials  
Condition of Sample as Received: Satisfactory  
Delivered by: Courier

### Volatile Organics

SW846 Method 8021B

Parameter for AB56339	Result (in ug/L)	MDL	Analyzed	Analyst
Benzene	Not detected	2.0	09/09/99	SK
Toluene	Not detected	2.0	09/09/99	SK
Ethylbenzene	Not detected	2.0	09/09/99	SK
m,p-Xylenes	Not detected	4.0	09/09/99	SK
o-Xylene	Not detected	2.0	09/09/99	SK
Naphthalene	Not detected	2.0	09/09/99	SK
1,2,4-Trimethylbenzene	Not detected	2.0	09/09/99	SK
1,3,5-Trimethylbenzene	Not detected	2.0	09/09/99	SK
Methyl-t-butyl ether	Not detected	2.0	09/09/99	SK
Bromofluorobenzene (%SR)	101	0.00	09/09/99	SK

# SPECTRUM ANALYTICAL, INC.

## Laboratory Report

Client ID: **TRIP**  
Lab ID No: **AB56340**

Location: **DPW/Rt 30 - Brattleboro, VT**  
Client Job No: **40191**

Matrix: **Deionized Water**  
Sampled on 09/09/99 Client **ECS**  
Received on 09/09/99 by **KC**  
QC and Data Review by **MD**

Preservative: **Refrigeration, HCl**  
Container: **1 VOA Vial**  
Condition of Sample as Received: **Satisfactory**  
Delivered by: **Courier**

### Volatile Organics

SW846 Method 8021B

Parameter for AB56340	Result (in ug/L)	MDL	Analyzed	Analyst
Benzene	Not detected	1.0	09/21/99	SK
Toluene	Not detected	1.0	09/21/99	SK
Ethylbenzene	Not detected	1.0	09/21/99	SK
m,p-Xylenes	Not detected	2.0	09/21/99	SK
o-Xylene	Not detected	1.0	09/21/99	SK
Naphthalene	Not detected	1.0	09/21/99	SK
1,2,4-Trimethylbenzene	Not detected	1.0	09/21/99	SK
1,3,5-Trimethylbenzene	Not detected	1.0	09/21/99	SK
Methyl-t-butyl ether	Not detected	1.0	09/21/99	SK
Bromofluorobenzene (%SR)	86		09/21/99	SK

# Spectrum Analytical, Inc.

## Laboratory Report Supplement

### References

- Methods for the Determination of Organic Compounds in Drinking Water. EPA-600/4-88/039. EMSL 1988.
- Methods for Chemical Analysis of Water and Wastes. EPA 600/4-79-020. EMSL 1983.
- Methods for Organic Chemical Analysis of Municipal and Industrial Wastewater. EPA 600/4-82-057. EMSL 1982.
- Test Methods for Evaluating Solid Waste. Physical/Chemical Methods. EPA SW-846. 1986.
- Standard Methods for the Examination of Water and Wastes. APHA-AWWA-WPCF. 19th Edition. 1995.
- Standard Methods for Comparison of Waterborne Petroleum Oils by Gas Chromatography. ASTM D 3328. 1982.
- Oil Spill Identification System. U.S. Coast Guard CG-D-52-77. 1977.
- Handbook for Analytical Quality Control in Water and Wastewater Laboratories. EPA 600/4-79-019. EMSL 1979.
- Choosing Cost-Effective QA/QC (Quality Assurance/Quality Control) Programs for Chemical Analyses. EPA 600/4-85/056. EMSL 1985.

### Report Notations

Not Detected,	=	The compound was not detected at a concentration equal to or above	
Not Det, ND or nd		the established method detection limit.	
NC	=	Not Calculated	
MCL	=	EPA Maximum Contamination Level	
VOA	=	Volatile Organic Analysis	
BFB	=	4-Bromofluorobenzene	(An EPA 624 Surrogate)
p-DFB	=	1,4-Difluorobenzene	(An EPA 624 Surrogate)
CLB-d5	=	Chlorobenzene-d5	(An EPA 624 Surrogate)
BCP	=	2-Bromo-1-chloropropane	(An EPA 601 Surrogate)
TFT	=	a,a,a-Trifluorotoluene	(An EPA 602 Surrogate)
Decachlorobiphenyl	=	(an EPA 608/8080 Surrogate)	

### Definitions

**Surrogate Recovery** = The recovery (expressed as a percent) of a non-method analyte (see surrogates listed above) added to the sample for the purpose of monitoring system performance.

**Matrix Spike Recovery** = The recovery (expressed as a percent) of method analytes added to the sample for the purpose of determining any effect of sample composition on analyte recovery.

**Laboratory Replicate** = Two sample aliquots taken in the analytical laboratory and analyzed separately with identical procedures. Analyses of laboratory duplicates give a measure of the precision associated with laboratory procedures, but not with sample collection, preservation, or storage procedures.

**Field Duplicate** = Two separate samples collected at the same time and place under identical circumstances and treated exactly the same throughout field and laboratory procedures. Analysis of Field duplicates give a measure of the precision associated with sample collection, preservation and storage, as well as with laboratory procedures.

**Relative Percent Difference (% RPD)** = The precision measurement obtained on duplicate/replicate analyses. %RPD is calculated as:

$$\%RPD = \frac{(\text{value1} - \text{value2})}{\text{ave. value}} * 100\%$$

0913 1042



SPECTRUM ANALYTICAL

## CHAIN OF CUSTODY RECORD

Page 1 of 1

## Special Handling:

☒ Standard TAT - 7 to 10 business days

☐ Rush TAT - Date Needed: \_\_\_\_\_

• All TATs subject to laboratory approval; min. 24 hour notification needed for rushes.

• Samples disposed of after 60 days unless otherwise instructed.

Report To: <u>ECS-VT</u>	Invoice To: <u>ECS Agawam</u>	Project No.: <u>40191</u>
		Site Name: <u>Brattleboro DPW</u>
		Location: <u>Rt. 30 Bratt.</u> State: <u>VT</u>
Project Mgr.: <u>D. Bath</u>	P.O. No.: _____ RQN: <u>2721</u>	Sampler(s): <u>L. Gilmore</u>

1=4°C 2=HCl 3=H<sub>2</sub>SO<sub>4</sub> 4=HNO<sub>3</sub> 5=NaOH 6=MeOH 7=\_\_\_\_\_

DW=Drinking Water GW=Ground Water WW=Waste Water

SO=Soil SL=Sludge O=Oil X1=DH<sub>2</sub>O X2=\_\_\_\_\_

G=Grab C=Composite

Lab Id:	Sample Id:	Date:	Time:	Type	Matrix	Preservative	pH	# Of VOA Vials	# Of Amber Glass	# Of Clear Glass	# Of Plastic	Containers:	Analyses:	Notes:
AB <u>56336</u>	<u>SB-1</u>	<u>9/9/99</u>	<u>10:00</u>	<u>G</u>	<u>GW</u>	<u>1</u>			<u>1</u>					
AB <u>56337</u>	<u>SB-2</u>		<u>10:20</u>	<u>G</u>	<u>GW</u>	<u>1</u>			<u>1</u>					
AB <u>56338</u>	<u>SB-3</u>		<u>11:00</u>	<u>G</u>	<u>GW</u>	<u>1</u>			<u>1</u>					
AB <u>56336</u>	<u>SB-1</u>		<u>10:00</u>	<u>G</u>	<u>GW</u>	<u>1.2</u>		<u>2</u>						
AB <u>56337</u>	<u>SB-2</u>		<u>10:20</u>	<u>G</u>	<u>GW</u>	<u>1.2</u>		<u>2</u>						
AB <u>56338</u>	<u>SB-3</u>		<u>11:00</u>	<u>G</u>	<u>GW</u>	<u>1.2</u>		<u>2</u>						
AB <u>56339</u>	<u>DUP</u>		<u>—</u>	<u>G</u>	<u>GW</u>	<u>1.2</u>		<u>2</u>						
AB <u>56340</u>	<u>TRIP</u>		<u>8:00</u>	<u>G</u>	<u>X<sub>1</sub></u>	<u>1.2</u>		<u>1</u>						
AB														
AB														

Additional Instructions: Keep ColdVT VOCSCAN

Relinquished By:

L. Gilmore

Received By:

Domenick Cordano

Date:

9/9/99

Time:

11:30Fax results when available to 802 257-1153